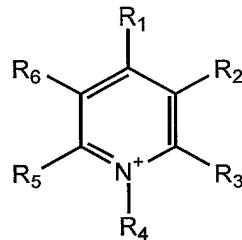


**WHAT IS CLAIMED IS:**

1. A method for removing scale deposited in a wellbore or in the near wellbore area of a subterranean formation comprising contacting said scale with an effective amount of a fluid comprising an ionic liquid, or mixture of ionic liquids, solvent for said scale.
- 5 2. The method of claim 1 in which an ionic liquid of the fluid comprises nitrogen-containing cations, and anions of a Lewis acid or of a non-Lewis acid.
3. The method of claim 2 in which an ionic liquid of the fluid comprises heterocyclic nitrogen-containing cations, and anions of a Lewis acid.
- 10 4. The method of claim 1 in which an ionic liquid of the fluid comprises amine cations, and anions of a Lewis acid.
5. The method of claim 4 in which an ionic liquid of the fluid comprises secondary amine cations, and anions of a Lewis acid.
- 15 6. The method of claim 1, in which an ionic liquid of the fluid is comprised of cations having the formula

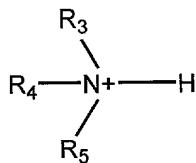


in which R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, and R<sub>6</sub> are selected from H, F, and saturated and unsaturated hydrocarbon containing from 1 to 22 carbons, respectively, with the provision that the total number of carbon atoms contained by R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, and R<sub>6</sub> does not exceed 24.

7. The method of claim 6, in which the anions are selected from  $\text{BF}_4^-$ ;  $\text{PF}_6^-$ ;  $\text{SbF}_6^-$ ;  $\text{CF}_3\text{SO}_3^-$ ;  $\text{AlCl}_4^-$ ;  $\text{RAlCl}_3^-$ , wherein R is alkyl containing 1 through 8 carbon atoms;  $\text{R}_2\text{AlCl}_2^-$ , wherein R is alkyl containing 1 through 8 carbon atoms;  $\text{CuCl}_2^-$ ;  $\text{Cu}_2\text{Cl}_3^-$ ;  $\text{Cu}_3\text{Cl}_4^-$ ;  $\text{Al}_2\text{Cl}_7^-$ ;  $\text{Al}_3\text{Cl}_{10}^-$ ;  $\text{NO}_3^-$ ;  $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ ;  $\text{Br}^-$ ;  $\text{ClO}_4^-$ ;  $\text{CH}_3\text{COO}^-$ ; and  $\text{BPh}_4^-$ .

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8. The method of claim 1, in which ionic liquid of the fluid is comprised of cations having the formula

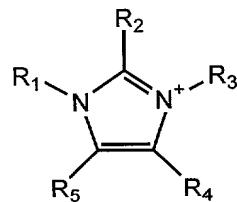


10 in which  $\text{R}_3$ ,  $\text{R}_4$ , and  $\text{R}_5$  are selected from H, and saturated and unsaturated hydrocarbon containing from 1 to 22 carbons, respectively, provided that  $\text{R}_3$ ,  $\text{R}_4$ , and  $\text{R}_5$  are not simultaneously H, and further provided that the total number of carbon atoms contained by  $\text{R}_3$ ,  $\text{R}_4$ , and  $\text{R}_5$ , does not exceed 24.

15 9. The method of claim 8, in which the anions are selected from  $\text{BF}_4^-$ ;  $\text{PF}_6^-$ ;  $\text{SbF}_6^-$ ;  $\text{CF}_3\text{SO}_3^-$ ;  $\text{AlCl}_4^-$ ;  $\text{RAlCl}_3^-$ , wherein R is alkyl containing 1 through 8 carbon atoms;  $\text{R}_2\text{AlCl}_2^-$ , wherein R is alkyl containing 1 through 8 carbon atoms;  $\text{CuCl}_2^-$ ;  $\text{Cu}_2\text{Cl}_3^-$ ;  $\text{Cu}_3\text{Cl}_4^-$ ;  $\text{Al}_2\text{Cl}_7^-$ ;  $\text{Al}_3\text{Cl}_{10}^-$ ;  $\text{NO}_3^-$ ;  $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ ;  $\text{Br}^-$ ;  $\text{ClO}_4^-$ ;  $\text{CH}_3\text{COO}^-$ ; and  $\text{BPh}_4^-$ .

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10. The method of claim 1, in which ionic liquid of the fluid is comprised of cations having the formula



in which  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ , and  $R_5$ , are selected from H, F, and saturated and unsaturated hydrocarbon containing from 1 to 22 carbons, respectively, with the provision that the total number of carbon atoms contained by  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ , and  $R_5$ , does not exceed 24

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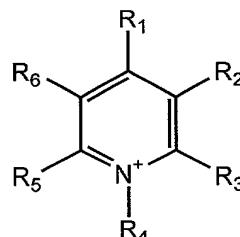
11. The method of claim 10 in which the anions are selected from  $BF_4^-$ ;  $PF_6^-$ ;  $SbF_6^-$ ;  $CF_3SO_3^-$ ;  $AlCl_4^-$ ;  $RAlCl_3^-$ , wherein R is alkyl containing 1 through 8 carbon atoms;  $R_2AlCl_2^-$ , wherein R is alkyl containing 1 through 8 carbon atoms;  $CuCl_2^-$ ;  $Cu_2Cl_3^-$ ;  $Cu_3Cl_4^-$ ;  $Al_2Cl_7^-$ ;  $Al_3Cl_{10}^-$ ;  $NO_3^-$ ;  $(CF_3SO_2)_2N^-$ ;  $Br^-$ ;  $ClO_4^-$ ;  $CH_3COO^-$ ; and  $BPh_4^-$ .
12. The method of claim 1 in which the fluid further comprises a scale reducing agent.
- 15 13. The method of claim 2 in which the fluid further comprises a scale reducing agent.
14. The method of claim 3 in which the fluid further comprises a scale reducing agent.
- 20 15. A method for removing scale deposited in a wellbore or near wellbore area of a subterranean formation comprising providing precursors of an ionic liquid which react exothermically in a wellbore or near wellbore area of a subterranean formation, and allowing said precursors to react to form an ionic liquid and generate heat in said wellbore or wellbore and near wellbore area.
- 25 16. The method of claim 15 in which the ionic liquid formed comprises nitrogen-containing cations, and anions of a Lewis acid or of a non-Lewis acid.

17. The method of claim 16 in which the ionic liquid formed comprises heterocyclic nitrogen-containing cations, and anions of a Lewis acid.

5 18. The method of claim 15 in which the ionic liquid formed comprises amine cations, and anions of a Lewis acid.

19. The method of claim 18 in which the ionic liquid formed comprises secondary amine cations, and anions of a Lewis acid.

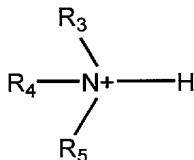
10 20. The method of claim 1, in which ionic liquid of the fluid is comprised of cations having the formula



in which R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>5</sub>, are selected from H, F, and saturated and unsaturated hydrocarbon containing from 1 to 22 carbons, respectively, with the provision that the total number of carbon atoms contained by R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>5</sub>, does not exceed 24

15 21. The method of claim 20 in which the anions are selected from BF<sub>4</sub><sup>-</sup>; PF<sub>6</sub><sup>-</sup>; SbF<sub>6</sub><sup>-</sup>; CF<sub>3</sub>SO<sub>3</sub><sup>-</sup>; AlCl<sub>4</sub><sup>-</sup>; RAlCl<sub>3</sub><sup>-</sup>, wherein R is alkyl containing 1 through 8 carbon atoms; R<sub>2</sub>AlCl<sub>2</sub><sup>-</sup>, wherein R is alkyl containing 1 through 8 carbon atoms; CuCl<sub>2</sub><sup>-</sup>; Cu<sub>2</sub>Cl<sub>3</sub><sup>-</sup>; Cu<sub>3</sub>Cl<sub>4</sub><sup>-</sup>; Al<sub>2</sub>Cl<sub>7</sub><sup>-</sup>; Al<sub>3</sub>Cl<sub>10</sub><sup>-</sup>; NO<sub>3</sub><sup>-</sup>; (CF<sub>3</sub>SO<sub>2</sub>)<sub>2</sub>N<sup>-</sup>; Br<sup>-</sup>; ClO<sub>4</sub><sup>-</sup>; CH<sub>3</sub>COO<sup>-</sup>; and BPh<sub>4</sub><sup>-</sup>.

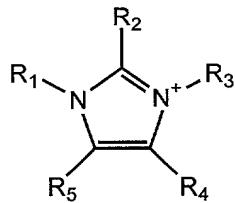
22. The method of claim 15 in which an ionic liquid formed is comprised of cations having the formula



in which R<sub>3</sub>, R<sub>4</sub>, and R<sub>5</sub> are selected from H, and saturated and unsaturated hydrocarbon containing from 1 to 22 carbons, respectively, provided that R<sub>3</sub>, R<sub>4</sub>, and R<sub>5</sub> are not simultaneously H, and further provided that the total number of carbon atoms contained by R<sub>3</sub>, R<sub>4</sub>, and R<sub>5</sub>, does not exceed 24.

5 23. The method of claim 22 in which the anions are selected from BF<sub>4</sub><sup>-</sup>; PF<sub>6</sub><sup>-</sup>; SbF<sub>6</sub><sup>-</sup>; CF<sub>3</sub>SO<sub>3</sub><sup>-</sup>; AlCl<sub>4</sub><sup>-</sup>; RAlCl<sub>3</sub><sup>-</sup>, wherein R is alkyl containing 1 through 8 carbon atoms; R<sub>2</sub>AlCl<sub>2</sub><sup>-</sup>, wherein R is alkyl containing 1 through 8 carbon atoms; CuCl<sub>2</sub><sup>-</sup>; Cu<sub>2</sub>Cl<sub>3</sub><sup>-</sup>; Cu<sub>3</sub>Cl<sub>4</sub><sup>-</sup>; Al<sub>2</sub>Cl<sub>7</sub><sup>-</sup>; Al<sub>3</sub>Cl<sub>10</sub><sup>-</sup>; NO<sub>3</sub><sup>-</sup>; (CF<sub>3</sub>SO<sub>2</sub>)<sub>2</sub>N<sup>-</sup>; Br<sup>-</sup>; ClO<sub>4</sub><sup>-</sup>; CH<sub>3</sub>COO<sup>-</sup>; and BPh<sub>4</sub><sup>-</sup>.

10 15 24. The method of claim 15 in which the ionic liquid formed is comprised of cations having the formula



in which R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>5</sub>, are selected from H, F, and saturated and unsaturated hydrocarbon containing from 1 to 22 carbons, respectively, with the provision that the total number of carbon atoms contained by R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>5</sub>, does not exceed 24.

25. The method of claim 24 in which the anions are selected from BF<sub>4</sub><sup>-</sup>; PF<sub>6</sub><sup>-</sup>; SbF<sub>6</sub><sup>-</sup>; CF<sub>3</sub>SO<sub>3</sub><sup>-</sup>; AlCl<sub>4</sub><sup>-</sup>; RAlCl<sub>3</sub><sup>-</sup>, wherein R is alkyl containing 1 through 8 carbon atoms; R<sub>2</sub>AlCl<sub>2</sub><sup>-</sup>, wherein R is alkyl containing 1 through 8 carbon atoms; CuCl<sub>2</sub><sup>-</sup>; Cu<sub>2</sub>Cl<sub>3</sub><sup>-</sup>; Cu<sub>3</sub>Cl<sub>4</sub><sup>-</sup>; Al<sub>2</sub>Cl<sub>7</sub><sup>-</sup>; Al<sub>3</sub>Cl<sub>10</sub><sup>-</sup>; NO<sub>3</sub><sup>-</sup>; (CF<sub>3</sub>SO<sub>2</sub>)<sub>2</sub>N<sup>-</sup>; Br<sup>-</sup>; 5 ClO<sub>4</sub><sup>-</sup>; CH<sub>3</sub>COO<sup>-</sup>; and BPh<sub>4</sub><sup>-</sup>.

26. The method of claim 15 in which the ionic liquid formed further comprises a scale reducing agent.

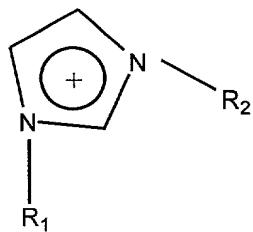
10 27. The method of claim 16 in which the ionic liquid formed further comprises a scale reducing agent.

28. The method of claim 17 in which the ionic liquid formed further comprises a scale reducing agent.

15 29. The method of any one of claims 1 through 14 in which the ionic liquid, or at least one member of the mixture thereof, is reactive with water, and the ionic liquid or mixture thereof is contacted with an aqueous liquid in the wellbore or near wellbore area.

20 30. The method of any one of claims 15 through 28 in which the ionic liquid formed is reactive with water, and the ionic liquid formed is contacted with an aqueous liquid in the wellbore or near wellbore area.

25 31. The method of claim 2 wherein the cations have the formula

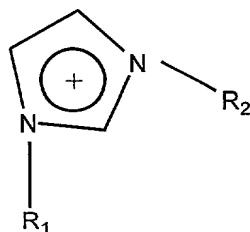


wherein R<sub>1</sub> is -CH<sub>3</sub>, and R<sub>2</sub> is -CH<sub>2</sub>CH<sub>3</sub>.

32. The method of claim 1 wherein the cations and anions are in the ratio of 1:1.

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33. The method of claim 1 in which the anions are selected from the group consisting of [Al<sub>2</sub>Cl<sub>7</sub>]<sup>-</sup> and [AlCl<sub>4</sub>]<sup>-</sup>, and the cations have the formula



wherein R<sub>1</sub> is -CH<sub>3</sub>, and R<sub>2</sub> is -CH<sub>2</sub>CH<sub>3</sub>.

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34. The method of claim 1 in which the anion is [Al<sub>2</sub>Cl<sub>7</sub>]<sup>-</sup>.

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35. The method of any one of claims 1 through 14, in which said ionic liquid is substantially pure.

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36. The method of claim 1 in which the cations are selected from imidazolium, pyridinium, and tetraalkylammonium ions.

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37. The method of claim 1 in which said ionic liquid is trimethylammonium heptachlorodialuminato.

38. The method of claim 8 in which the ionic liquid comprises triethylamine dialuminum heptachloride.

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39. The method of claim 1 in which the fluid further comprises a strong acid or super acid.

40. A composition comprising an ionic liquid, or mixture of ionic liquids, disposed in an encapsulant material adapted for controlled release of the ionic liquid, or mixture thereof.

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41. The composition of claim 41 in which the ionic liquid or liquids of the fluid comprise nitrogen-containing cations, and anions of a Lewis acid or of a non-Lewis acid.

10 42. A composition comprising a precursor of an ionic liquid disposed in an encapsulant material adapted for controlled release of the precursor.

15 43. A method for removing scale deposited in a wellbore or near wellbore area of a subterranean formation comprising providing an effective amount of an encapsulated fluid in the wellbore or near wellbore area, and releasing or allowing the fluid to be released in the wellbore or near wellbore area, the fluid comprising an ionic liquid, a mixture of ionic liquids, or precursors of an ionic fluid.

20 44. The method of claim 43 in which an ionic liquid of the fluid comprises nitrogen-containing cations, and anions of a Lewis acid or of a non-Lewis acid.

25 45. A method of dissolving BaSO<sub>4</sub> scale comprising contacting the BaSO<sub>4</sub> scale with a fluid comprising an ionic liquid or mixture of ionic liquids.

46. A method of dissolving sludge comprising contacting the sludge with a fluid comprising an ionic liquid or mixture of ionic liquids.